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Notice of Allowability

Application No.

09/675,908

Applicant(s)

HUH ET AL.

Examiner

Art Unit

Herng-der Day

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Response received 7/8/05.
2. ☒ The allowed claim(s) is/are 1-18.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

1. This communication is in response to Applicants' Response to Office Action dated May 19, 2005, faxed July 8, 2005.

1-1. Claims 1, 13-14, and 17 have been amended. Claims 19-20 have been cancelled. Claims 1-18 are pending.

1-2. Claims 1-18 have been examined and allowed.

Reasons for Allowance

2. The following is an Examiner's statement of reasons for allowance:

2-1. The closest prior art of record discloses:

(1) An approximate dual zone mixing model (Fayers et al., "Effects of Heterogeneities on Phase Behavior in Enhanced Oil Recovery").

(2) A modified invasion percolation algorithm to model quasistatic displacement processes (Meakin et al., "Simulations of One- and Two-Phase Flow in Fractures");

(3) Using percolation theory to predict oil recovery (King et al., "Predicting Oil Recovery Using Percolation").

2-2. Independent claim 1 is directed at a computer-implemented method for simulating characteristics of a multi-component, hydrocarbon-bearing formation. Although applying dual zone mixing model as well as percolation theory to predict oil recovery are obvious as disclosed in the prior art of record, this independent claim identifies the distinct feature of "(c) constructing a model representative of fluid properties within each region, fluid flow between gridcells using

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principles of percolation theory to provide fine-grid adverse mobility displacement behavior through functional dependencies, and principles of component mass transfer rate between regions” as described at page 15, which has not been uncovered in a single teaching, nor would a modification of prior art references be obvious to one of ordinary skill in the art to yield these limitations in the context of the claim. Claim 1 is deemed allowable.

Dependent claims 2-13 are allowable as they depend on the allowed independent claim 1.

2-3. Independent claim 14 is directed at a computer-implemented method for simulating characteristics of a multi-component, hydrocarbon-bearing formation. Although applying dual zone mixing model as well as percolation theory to predict oil recovery are obvious as disclosed in the prior art of record, this independent claim identifies the distinct feature of “(c) constructing a model comprising functions representative of mobility of each phase in each region using principles of percolation theory to provide fine-grid adverse mobility displacement behavior through functional dependencies, functions representative of phase behavior within each region, and functions representative of rate of mass transfer of each component between the regions” as described at page 15, which has not been uncovered in a single teaching, nor would a modification of prior art references be obvious to one of ordinary skill in the art to yield these limitations in the context of the claim. Claim 14 is deemed allowable.

Dependent claim 15 is allowable as it depends on the allowed independent claim 14.

2-4. Independent claim 16 is directed at a computer-implemented system for determining characteristics of a multi-component, hydrocarbon-bearing formation. Although applying dual zone mixing model as well as percolation theory to predict oil recovery are obvious as disclosed in the prior art of record, this independent claim identifies the distinct feature of “mobility of

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fluids in each region being determined based on principles of percolation theory to provide fine-grid adverse displacement behavior through functional dependencies” as described at page 15, which has not been uncovered in a single teaching, nor would a modification of prior art references be obvious to one of ordinary skill in the art to yield these limitations in the context of the claim. Claim 16 is deemed allowable.

Dependent claim 17 is allowable as it depends on the allowed independent claim 16.

2-5. Independent claim 18 is directed at a method of simulating at least one component of a multicomponent fluid system in a hydrocarbon-bearing formation by means of a simulator on a computer. Although applying dual zone mixing model as well as percolation theory to predict oil recovery are obvious as disclosed in the prior art of record, this independent claim identifies the distinct feature of “mobility of fluids in each region being determined based on principles of percolation theory to provide fine-grid adverse mobility displacement behavior through functional dependencies” as described at page 15, which has not been uncovered in a single teaching, nor would a modification of prior art references be obvious to one of ordinary skill in the art to yield these limitations in the context of the claim. Claim 18 is deemed allowable.

3. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

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Conclusion

4. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Herng-der Day whose telephone number is (571) 272-3777. The Examiner can normally be reached on 9:00 - 17:30.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: (571) 272-2100.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Jean R. Homere can be reached on (571) 272-3780. The fax phone numbers for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Herng-der Day
September 1, 2005

H.D.

J.R. HOMERE
JEAN R. HOMERE
PRIMARY EXAMINER